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As shown in Figures 30, 31 and 33 the ends of the battens have inclines 48, that is the end walls may be inclined at about 70° to the horizontal. Again, this assists in reducing abrasion or tearing of the film 43 in the corner regions of the load 1.

5 Modifications may be made to the method and apparatus described above without departing from the scope of the invention claimed.

10 For example, at the first wrapping station, the embodiment described utilises two film dispensers 40 mounted on uprights 41. The use of two film dispensers reduces the wrapping cycle time. However, the two dispensers 40 could be replaced by a single film dispenser 40.

15 Also, at the first wrapping station the wrapping platform 20 is in the form of a rotary turntable, which rotates relative to the fixed film dispensers 40. It would be possible to utilise a non-rotatable platform, but have the film dispensers 40 rotate around the platform 20, for example utilising an arrangement similar to that described in the second wrapping station.

20 Modifications may also be made to the wrapping arrangement at the second wrapping station. For example, the belt table 50 may be rotated, in well known manner, about a vertical axis relative to one or more fixed film dispensers 40.

25 Furthermore, at either, or both of the first and second wrapping stations, there could be contra-rotation of the wrapping platform 20 (and/or belt table 50) relative to a rotatable dispenser or dispensers 40, for example as described in PCT WO 99/64297.

30 The words "comprises/comprising" and the words "having/including" when used herein with reference to the present invention are used to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Claims

1. A method for wrapping loads (1) in a wrapping material (43) comprising the steps of:
- 5 (a) placing at least two battens (10) in a spaced, substantially parallel orientation on one surface of the load (1); and
- (b) at least partially wrapping the load in a wrapping material (43) such that the battens (10) are at least partially enveloped in the wrapping material (43) and held in place on the surface of the load (1).
- 10 2. A method as claimed in claim 1 in which the load (1) is at least partially wrapped by establishing relative rotational motion between the load (1) and a dispensing means (40) for the wrapping material.
- 15 3. A method as claimed in claim 1 for wrapping loads (1) of goods or materials in a wrapping material, such as a plastics film (43), which comprises placing at least two battens (10) in a spaced substantially parallel orientation on one surface of the load (1), at least partially wrapping the load in a wrapping material (43) by rotating the load (1) relative to dispensing means (40) for the wrapping material (43), and/or rotating the
- 20 dispensing means (40) around the load, to envelop the battens (10) in the wrapping material and to hold the battens (10) in place on the surface of the load (1), the battens (10) being placed apart to support the load (1) and being adapted to receive therebetween the forks of a fork-lift truck for transporting the load.
- 25 4. A method as claimed in any of claims 1 to 3 comprising placing the battens (10) on a top surface of the load (1), partially wrapping the load at a first wrapping station (5) with a wrapping material (43) including overlapping at least parts of the battens (10) with the wrapping material (43) to hold the battens (10) in position, turning the load through about 90° from the first wrapping station (5) to a second wrapping
- 30 station (6), and completing the wrapping of the load (1) at the second wrapping station (6), including enveloping the battens (10) in the wrapping material (43).

means (40) at the first wrapping station (5), means for establishing relative rotational motion between the platform (20) and dispensing means (40), to partially wrap the load (1), including at least overlapping part of the battens (10), with the wrapping material, transfer means (6) for transferring the load, through about 90°, to a second wrapping station (7), and means at the second wrapping station for completing the wrapping of the load (1).

7. Apparatus as claimed in Claim 6, wherein the wrapping means at the first wrapping station includes means for rotating the platform about a vertical axis, and the wrapping means at the second wrapping station includes a belt table (50) for rotating the load (1) about a substantially horizontal axis and film dispensing means (40) for relative rotation about a substantially vertical axis to apply film to the load as it is rotated about a horizontal axis.

8. Apparatus as claimed in Claim 6 or Claim 7, wherein the belt table (50) at the second wrapping station (7) is pivotable from a normally horizontal position, through approximately 90°, to a position in which engages with a load (1) on the wrapping platform (20), and the wrapping platform (20) is pivotally mounted, such that as the belt table (50) is returned to its original horizontal position the wrapping platform (20) is caused to swing from a normally horizontal position, through approximately 90°, to transfer the partially wrapped load (1) onto the belt table (50) at the second wrapping station (7).

9. Apparatus as claimed in claim 8, wherein the wrapping platform (20) is moveable horizontally and vertically such that it may align a load (1) on the wrapping platform (20) with the belt table (50) when the belt table (50) is in a substantially vertical position.

10. Apparatus as claimed in claim 8, wherein the belt table (50) is pivotable about a main pivot (60) one by means of at least one transfer ram (70) from its normal horizontal position, and the wrapping platform assembly (20) is also pivotable about

the main pivot (60), by means of at least one transfer ram (63), through approximately 90° towards the belt table (50).

11. Apparatus as claimed in claim 10, wherein the transfer ram (70), for pivoting the belt table (50) is pivotably connected to the wrapping platform assembly (20) such that
5 when the wrapping platform (20) is pivoted, through about 90°, by the second transfer ram (63), the belt table (50) is caused to pivot back to its original horizontal position to receive the partially wrapped load (1).
12. Apparatus as claimed in any of claims 6 to 11, wherein the batten placing means
10 comprises a pick and place mechanism (3).
13. Apparatus as claimed in any of claims 8 to 11, wherein the belt table (50) is
15 pivotably mounted at opposite ends such that it may be pivoted forwardly to engage with the load (1) on the wrapping table, and subsequent to the completion of wrapping at the second wrapping station (7), may be pivoted rearwardly to off-load the wrapped load (1).

[received by the International Bureau on 22 January 2001 (22.01.01);
original claim 5 amended; new claims 14-20 added;
remaining claims unchanged (4 pages)]

5. A method as claimed in claim 2, which comprises

- (a) placing at least two battens (10) on a top surface of the load (1);
- (b) before or after step (a) moving the load (1) onto a wrapping platform (20) at a first wrapping station (5);
- (c) rotating the wrapping platform (20) to rotate the load (1) relative to dispensing means (40) for wrapping material (43) and/or rotating the dispensing means (40) around the load (1) on the wrapping platform (20), to overlap at least part of the battens (10) to hold item in place on the load;
- (d) pivoting a wrapping table (50) at the second wrapping station (7) from a substantially horizontal position to a substantially vertical position;
- (e) before, after or simultaneously with step (d) moving the wrapping platform (20) with the load (1) horizontally and/or vertically to position the load (1) in a desired alignment with the wrapping table (50);
- (f) returning the wrapping table (50) back from the substantially vertical position to the substantially horizontal, and simultaneously turning the wrapping platform (20) from the horizontal position towards a substantially vertical position such that the load (1) is transferred from the wrapping platform (20) onto the wrapping table (50); and
- (g) rotating the load (1) about a substantially horizontal axis on the wrapping table (50) and simultaneously effecting a relative rotational movement, about a substantially vertical axis, between the load (1) and at least one film dispenser (80) to completely wrap the load (1) in wrapping material (43), including enveloping the battens (10) in the wrapping material (43).

6. Apparatus for wrapping a load (1) comprising a first wrapping station (5) including a wrapping platform (20) to receive the load (1) to be wrapped, batten placing means for placing battens (10) on a surface of the load, wrapping material dispensing

(60), by means of at least one transfer ram (63), through approximately 90° towards the belt table (50).

11. Apparatus as claimed in claim 10, wherein the transfer ram (70), for pivoting the belt table (50) is pivotably connected to the wrapping platform assembly (20) such that when the wrapping platform (20) is pivoted, through about 90°, by the second transfer ram (63), the belt table (50) is caused to pivot back to its original horizontal position to received the partially wrapped load (1).

12. Apparatus as claimed in any of claims 6 to 11, wherein the batten placing means comprises a pick and place mechanism (3).

13. Apparatus as claimed in any of claims 8 to 11, wherein the belt table (50) is pivotably mounted at opposite ends such that it may be pivoted forwardly to engage with the load (1) on the wrapping table, and subsequent to the completion of wrapping at the second wrapping station (7), may be pivoted rearwardly to off-load the wrapped load (1).

14. Apparatus for wrapping a load (1) comprising a first wrapping station (5) including a wrapping platform (20) to receive the load (1) to be wrapped, wrapping material dispensing means (40) at the first wrapping station (5), means for establishing relative rotational motion between platform (20) and dispensing means (40), to partially wrap the load (1) with the wrapping material, transfer means (6) for transferring the load, through about 90° to a second wrapping station (7), and means at the second wrapping station for completing the wrapping of the load (1), including a belt table (50) for rotating the load (1) about a substantially horizontal axis and film dispensing means (40) for relative rotation about a substantially vertical axis to apply film to the load as it is rotated about a horizontal axis, wherein the belt table (50) at the second wrapping station (7) is pivotable from a normally horizontal position, through approximately 90°, to a position in which engages with a load (1) on the wrapping platform (20), and the wrapping platform (20) is pivotally mounted, such that as the belt table (50) is returned to its original horizontal position the wrapping platform (20) is caused to swing from a

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normally horizontal position, through approximately 90°, to transfer the partially wrapped load (1) onto the belt table (50) at the second wrapping station (7), and wherein the wrapping platform (20) is moveable horizontally and vertically such that it may align a load (1) on the wrapping platform (20) with the belt table (50) when the belt table (50) is in a substantially vertical position.

15. Apparatus as claimed in claim 14, wherein the belt table (50) is pivotable about a main pivot (60) one by means of at least one transfer ram (70) from its normal horizontal position and the wrapping platform assembly (20) is also pivotable about the main pivot (60), by means of at least one transfer ram (63), through approximately 90° towards the belt table (50).

16. Apparatus as claimed in claim 15, wherein the transfer ram (70), for pivoting the belt table (50) is pivotably connected to the wrapping platform assembly (20) such that when the wrapping platform (20) is pivoted, through about 90°, by the second transfer ram (63), the belt table (50) is caused to pivot back to its original horizontal position to received the partially wrapped load (1).

17. Apparatus as claimed in any of claims 14 to 11, wherein the belt table (50) is pivotably mounted at opposite ends such that it may be pivoted forwardly to engage with the load (1) on the wrapping table, and subsequent to the completion of wrapping at the second wrapping station (7), may be pivoted rearwardly to off-load the wrapped load (1).

18. A method for wrapping loads (1) in a wrapping material (43) comprising the steps of:

(a) creating at least two fork-entry openings in a spaced, substantially parallel orientation on one surface of the load (1) without the use of a pallet platform; and

(b) at least partially wrapping the load in a wrapping material (43) such that the fork-entry openings are at least partially enveloped in the wrapping material (43) by establishing relative rotational motion between the load (1) and a dispensing means (40) for the wrapping material.

19. A method for wrapping loads (1) in wrapping material (43), which comprises
- (a) moving a load (1) onto a wrapping platform (20) at a first wrapping station (5);
 - (b) creating at least two fork-entry openings in a spaced, substantially parallel orientation on one surface of the load (1) without the use of a pallet platform;
 - (c) rotating the wrapping platform (20) to rotate the load (1) relative to dispensing means (40) for wrapping material (43) and/or rotating the dispensing means (40) around the load (1) on the wrapping platform (20), to partially wrap the load in wrapping material;
 - (d) pivoting a wrapping table (50) at the second wrapping station (7) from a substantially horizontal position to a substantially vertical position;
 - (e) before, after or simultaneously with step (a) moving the wrapping platform (20) with the load (1) horizontally and/or vertically to position the load (1) in a desired alignment with the wrapping table (50);
 - (f) returning the wrapping table (50) back from the substantially vertical position to the substantially horizontal, and simultaneously turning the wrapping platform (20) from the horizontal position towards a substantially vertical position such that the load (1) is transferred from the wrapping platform (20) onto the wrapping table (50); and
 - (g) rotating the load (1) about a substantially horizontal axis on the wrapping table (50) and simultaneously effecting a relative rotational movement, about a substantially vertical axis, between the load (1) and at least one film dispenser (80) to completely wrap the load (1) in wrapping material (43).